

400 Wh/kg Secondary Battery, Phase I

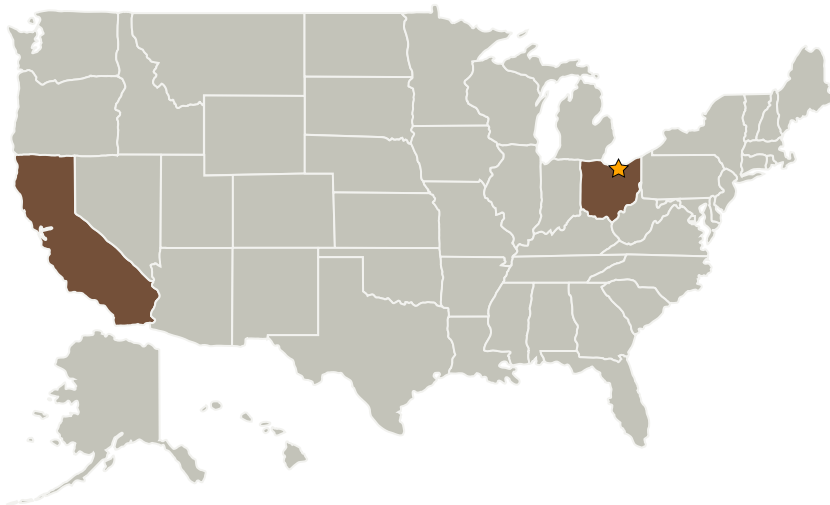
Completed Technology Project (2005 - 2005)



Project Introduction

Summary Lithium-ion battery technology will not provide significant breakthroughs beyond 200 Wh/kg. It will not provide adequate specific energy and cycle life for Earth Science missions. It will not enable the United States to reestablish its position of strategic technical advantage in portable energy storage. However, the next generation of secondary Li batteries is being developed in the US. It is based on lithium metal anodes and sulfur containing liquid cathodes. The sulfur-based cathode delivers a theoretical specific energy of 2450 Wh/kg, more than any other known cathode material of secondary cell. The Li-S battery needs advanced technology for improved stabilization of the Li anode in the corrosive environment of the liquid sulfur cathode. We propose a novel application of modern rocket fuel chemistry to create a self-healing, solid-electrolyte interface (SEI) layer. Li-S cells equipped with this robust passivation will stably perform at 400 Wh/kg level for ~ 300 cycles. At 200 Wh/kg a cycle life of ~ 1000 cycles is expected. The good low temperature performance and excellent rate capability features of Li-S cell will remain intact. These features are the next leap toward the advanced energy storage technologies required for Earth science observation platforms.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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| Organizations Performing Work | Role | Type | Location |
|-------------------------------|-------------------------|-------------|---------------------------|
| ★ Glenn Research Center(GRC) | Lead Organization | NASA Center | Cleveland, Ohio |
| Material Methods, LLC | Supporting Organization | Industry | Newport Beach, California |

Primary U.S. Work Locations

| | |
|------------|------|
| California | Ohio |
|------------|------|

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Alexander Gorkovenko

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.2 Energy Storage
 - └ TX03.2.1 Electrochemical: Batteries